REMARKS

Claims 1-24 were originally pending. Claims 1-6, 8-21, and 23 were amended. Claims 7, 22, and 24 were canceled. No claims have been added. Accordingly, claims 1-6, 8-21, and 23 are pending.

As a preliminary matter, under present practice, second or any subsequent actions on the merits shall be final, except where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment of the claims nor based on information submitted in an information disclosure statement. (MPEP §706.07(a)). In this case, the amendments to claims 1-6, 8-21, and 23 do not necessitate a new search on part of the Office or present additional matters for consideration. Thus, it is respectfully submitted that any subsequent rejection(s) on the merits, if any, will not be necessitated by applicant's claim amendments presented in this response

For example, claim 1 was amended to more particularly point out the feature "a deterministic amount of time" by adding "equivalent to an amount of time to insert a single thread into the run queue". This amendment to claim 1 was already supported by claim 2 as filed, which the Office has already had the opportunity to examine, and which recites in part "wherein associating the second plurality of threads with the run queue further comprises: inserting only the root thread into the run queue." Other claims are amended merely to correct antecedent basis issues, each of which have been addressed below in the section titled "35 USC §112, Second Paragraph Rejections".

Title Objection

The Action asserts that the title of the invention "Run Queue Management" is not descriptive, and a new title is required that is clearly indicative of the invention to which the claims are directed. In view of this the title has been changed to ""Systems and Methods for Managing a Run Queue". This title is clearly indicative of the invention to which the claims are directed. For instance, independent claim 1 recites in part "[a] method [...] for managing a run queue [...]." Independent claim 8 recites in part "[a] system for managing a run queue [...]." And, independent claim 16 recites "[a] computer-readable storage medium comprising computer-executable instructions to manage a run queue [...]." In view of this, it is respectfully submitted that the title is clearly indicative of the invention to which the claims are directed.

If the Office still would like to change the title, even in view of the above examples of the title's appropriateness, the Office is invited to suggest a new title.

Claim Objections

Claims 4-6, 8-15, 17-19, and 21 are objected to because of informalities. Claims 4-6, 8-15, 17-19, and 21 have been amended to correct the indicated informalities. In view of these amendments, withdrawal of the claim objections is respectfully requested.

35 USC §112, Second Paragraph Rejections

Claims 1-24 stand rejected under 35 USC §112, second paragraph as failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. In view of this rejection, claims 7, 22, and 24 have been canceled. Additionally, claims 4 and 10 have been amended to correct the lack of antecedent basis indicated by the Action.

With respect to claim 1, claim 1 has been amended to more particularly point out that "deterministic amount of time" is "equivalent to an amount of time to insert a single thread into the run queue". This amendment to claim 1 was already supported by claim 2 as filed, which the Office has already had the opportunity to examine, and which recites in part "wherein associating the second plurality of threads with the run queue further comprises: inserting only the root thread into the run queue."

Additionally, with respect to claim 1, the Action suggests that "Applicant should consider defining 'priority based scheduling semantic' in this claim." Applicant thanks the Office for this suggestion. However, definiteness of claim language must be analyzed, not in a vacuum, but in light of: (a) The content of the application disclosure; (b) The teachings of the prior art; and (c) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made". (See, MPEP §2173.02). In this case, the phrase "in a manner that maintains a priority based scheduling semantic of the run queue", as claim 1 recites is clearly described in the specification, for example, at page 24, line 19, through page 25, line 2. This

portion of the specification provides a clear example of what maintaining "a priority based scheduling semantic" means.

With respect to claims 2, 4-6, 16, and 23, the Action points out that "it is uncertain what priority is the root thread or how the second plurality of threads is sorted (i.e., ascending or descending), it is assumed, according to the specification and the claim language of claim 10 that the root thread has the highest priority and the subsequent threads or 'next thread' has the next lowest priority in the second plurality of threads."

Applicant respectfully cautions the Office from reading additional limitations into the claim language when those features are not already present in the subject matter. A fundamental principle contained in 35 U.S.C. 112, is that an Examiner "should not reject claims or insist on their own preferences if other modes of expression selected by applicants satisfy the statutory requirement. (MPEP §2173.02). In this case, it is respectfully submitted that the language of claims 2, 4-6, 16, and 23 already satisfy the statutory requirement by particularly pointing out and distinctly claiming the subject matter of the invention without reading the suggested limitations into the claims. In particular, the suggested limitations of a particular priority for the root thread or an ascending or descending order of sorting are not necessary for clarity or patentability.

With respect to claim 4, the Action asserts that the term "represent" is unclear. Applicant has amended to claim 4 to clarify the association operation. Thus, it is respectfully requested for the 35 USC §112, second paragraph rejection to claim 4 be withdrawn.

With respect to claims 3, 9, and 20, the Action indicates that "it is unclear what is meant by the phrases "other queue" or "more than a single other queue

access". The specification at page 24, line 25, through page 25, line 2, provides unambiguous examples of the phrase "other queue" and or "more than a single other queue access". More particularly, "block 1214 of the procedure inserts an additional node into the run queue independent of any access to any other queue such as a sleep queue or a wait queue".

The amendments to the claims have addressed any remaining 35 USC §112, second paragraph rejections to claims 1, 8, 11-15, 17-19, and 21 (See, "Claim Objections").

In view of the above, Applicant respectfully requests for the 35 USC §112, second paragraph rejections to claims 1-6, 8-21, and 23 be withdrawn.

35 USC §102(e) Rejections

Claims 1-12 and 14-22 stand rejected under 35 USC §102(e) as being anticipated by U.S. Patent no. 6,411,982 ("Williams"). This rejection is traversed. "[A] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." (MPEP §2131). Williams does not describe each and every element of claims 1-12 and 14-22 for the following reasons.

Claim 1 recites "managing a run queue comprising a first plurality of threads sorted with respect to one another based on thread priority, and "in a deterministic amount of time equivalent to an amount of time to insert a single thread into the run queue, associating a second plurality of threads that is priority sorted with the run queue in a manner that maintains a priority based scheduling semantic of the run queue." In addressing claim 1, the Office Action ("Action")

concludes that Williams at col. 2 (lines 1-5, 12-15, 52-55, and 65-67) and Fig. 2 describes these claimed features. This conclusion is unsupportable.

Williams, at col. 2 (lines 1-5, 12-15, 52-55, and 65-67) and Fig. 2, merely describes that adding *a single element* to a queue may take a constant amount of time or a variable amount of time depending on whether the single element is to be added to an empty sub-queue. It is respectfully submitted that Williams does not describe that adding multiple elements to the run queue is accomplished in the same amount of time that it takes to add only a single element to the queue. For example, if a system of Williams adds a single element *to a non-empty queue*, a constant amount of time is required to add the single element to the queue. In this same scenario (a non-empty queue), if the system of Williams adds multiple elements to the queue in a single thread scheduling operation, then Williams will require an amount of time to insert the multiple elements that will be equal to the constant amount of time needed to insert a single element *multiplied by the number of elements being added.* This means that the amount of time that the thread scheduling operation of Williams requires to insert a single element into the queue is not the same as the amount of time that Williams requires to insert multiple elements into the queue.

Accordingly, a system of Williams may never "in a deterministic amount of time equivalent to an amount of time to insert a single thread into the run queue, associating a second plurality of threads that is priority sorted with the run queue." For this reason alone, Williams does not describe each and every element of claim 1, and therefore, does not anticipate claim 1.

Accordingly, the 35 USC §102(e) rejection of claim 1 is improper and should be withdrawn.

As an additional matter, Applicant respectfully submits that Williams describes a conventional system such as those described in the "BACKGOUND" section of the patent application, wherein an operating system (OS) cannot guarantee that a process pre-empted during OS thread scheduling will only be pre-empted for a specific non-varying amount of time (i.e., the "amount of time to insert a single thread into the run queue") when more than a single element is added to the run queue during any one thread scheduling operation. This is because Williams requires a constant amount of time needed to insert a single thread into the run queue *multiplied by the number of threads that are to be added.* In conventional systems, the number of threads to be added to a run queue at any particular time typically varies. Because of this, Williams cannot guarantee that a varying number of threads in any one particular thread scheduling operation can be added to the run queue in a consistent, deterministic amount of time.

Claims 2-6 depend from claim 1 and are not anticipated by Williams by virtue of this dependency. For this reason alone, the 35 USC §102(e) rejections of claims 2-6 are improper and should be withdrawn.

Moreover, claims 2-6 recite additional features that are not anticipated by Williams. For example, claim 2 recites "wherein the second plurality of threads comprises a root thread" and "wherein associating the second plurality of threads with the run queue further comprises inserting only the root thread into the run queue". In addressing these features, the Action points to Williams at col. 3, lines 19-22 and block 208 of Fig. 2. It is respectfully submitted that these cited portions of Williams merely describe that a sub-queue representing a particular priority level has a "head pointer" that may need to be initialized to point to an element that is added to a queue. Again, this decribes adding a single element to a queue,

and not "associating the second plurality of threads with the run queue further comprises inserting only the root thread into the run queue", as claim 2 recites.

For this additional reasons, the 35 USC §102(e) rejection of claim 2 should be withdrawn.

Claim 8 recites in part "the run queue comprising a first plurality of threads, each thread in the first plurality having a respective priority, the first plurality being sorted such that a thread having a high priority is removed from the run queue before a thread having a lower priority" and "in an amount of time to insert a single thread into the run queue, associating the second plurality of threads that is priority sorted with the run queue, the associating maintaining a priority based scheduling semantic of the run queue." For the reasons already described above with respect to claim 1, Williams does not anticipate these recited features.

Accordingly, the 35 USC §102(e) rejection of claim 8 is improper and should be withdrawn.

Claims 9-15 depend from claim 8 and are not anticipated by Williams by virtue of this dependency. For this reason alone, the 35 USC §102(e) rejections of claims 9-15 are improper and should be withdrawn.

Moreover, claims 9-15 recite additional features that are not anticipated by Williams. For example, claim 10 recites "wherein the second plurality comprises a root thread operatively coupled to one or more other threads of the second plurality, each of the one or more other threads having a respective priority that is a lower priority or an equal priority as compared to a priority of the root node." Williams does not describe multiple elements with different priorities associated with a root thread. Instead, Williams at col. 1, lines 19-27, and Fig. 1, respectively describes and illustrates use of multiple queues (sub-queues) to represent a run

queue, wherein each sub-queue queue includes only elements of the same identical priority. Thus, Williams does not describe the second plurality comprises a root thread operatively coupled to one or more other threads of the second plurality, each of the one or more other threads having a respective priority that is a lower priority or an equal priority as compared to a priority of the root node", as claim 10 recites. For this additional reason, Williams does not describe each and every element of claim 10.

Accordingly, and for this additional reason, the 35 USC §102(e) rejection of claim 10 should be withdrawn.

In another example, claim 11 recites "wherein associating the second plurality of threads with the run queue further comprises inserting only a root thread of the second plurality into the run queue." For the reasons already discussed above with respect to claims 1 and 2, Williams does not anticipate this feature.

Accordingly, and for this additional reason, the 35 USC §102(e) rejection of claim 11 should be withdrawn.

Claim 16 recites "in a deterministic amount of time that is independent of the number of threads in a second plurality of threads that is priority sorted, the deterministic amount of time being a time to insert a single thread into the run queue, associating the second plurality of threads with the run queue in a manner that maintains a priority based scheduling semantic of the run queue." For the reasons already described above with respect to claim 1, Williams does not anticipate these claimed features.

Accordingly, the 35 USC §102(e) rejection of claim 16 is improper and should be withdrawn.

Claims 17-21 depend from claim 16 and are not anticipated by Williams by virtue of this dependency. For this reason alone, the 35 USC §102(e) rejections of claims 17-21 are improper and should be withdrawn.

Moreover, claims 17-21 recite additional features that are not anticipated by Williams. For example, claim 17 recites "wherein the second plurality of threads comprises a root thread that is operatively coupled to one or more other threads of the second plurality, and "inserting only the root thread into the first plurality of threads to represent the second plurality of threads." For the reasons already discussed above with respect to claims 1 and 2, Williams does not anticipate this feature.

Accordingly, and for this additional reason, the 35 USC §102(e) rejection of claim 17 should be withdrawn.

35 USC §103(a) Rejections

Claims 23 and 24 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent no. 6,411,982 ("Williams"). Claim 24 has been canceled. The rejection of claim 23 is traversed. A prima facie case of obviousness requires: (1) one or more references (2) that were available to the inventor (3) that teach (4) a suggestion to combine or modify the references, (5) the combination or modification of which would appear to be sufficient to have made the claimed invention obvious to one of ordinary skill in the art at the time of invention. The Action has not presented a prima facie case of obviousness in rejecting claim 23 for the following reasons.

Claim 23 recites "[a] run queue data structure comprising: a first dimension data field comprising a first plurality of threads sorted with respect to thread

priority", and "a second dimension data field comprising a second plurality of threads sorted based on thread priority, the second plurality of threads comprising a root thread and one or more other threads." In addressing this claim, the Action admits that Williams does not teach these recited features. To supply these admittedly missing features, the Action asserts, without pointing to any additional reference, "that it would have been obvious to one of ordinary skill in the art to see Williams' queues as to having first and second dimensional arrangement. Because doing so would improve the efficiency and performance of the run queue by allowing the task to run as close to its scheduled time as possible by inserting the next highest priority task at the current time to be run closes to the front of the run queue to be executed" This conclusion is unsupportable.

MPEP §2143 clearly indicates that the Office may not use the patent application as a basis for the motivation to modify the prior art to arrive at the claimed invention. An invention is not obvious when the suggestion to combine the teachings of the patent application with what is seemingly the Examiner's personal knowledge comes from the patent application. In this case, nowhere does Williams teach or suggest use of a multi-dimensional "run queue data structure", as claim 23 recites.

Williams at col. 4, lines 15-30, teaches that multiple independent sub-queues are used to represent a run queue; each sub-queue queue includes only elements of a same identical priority. Williams, at col. 2, lines 32-35, also teaches that a pointer table 104, which is an array, is used to arrange pointers to the subqueues in order of respective subqueue priorities. Williams teaches that elements are added to the run queue "by linking or inserting them into their appropriate subqueue, typically at the bottom of the subqueue", or at the top if the

subqueue is empty. Nowhere does use of such a table to arrange the subqueues of Williams or adding elements one by one to a subqueue (at the bottom or the top) teach or suggest using "[a] run queue data structure comprising: a first dimension" and "a second dimension" to "improve the efficiency and performance of [Williams] by allowing the task to run as close to its scheduled time as possible by inserting the next highest priority task at the current time to be run closes to the front of the run queue to be executed".

In view of the above, it is respectfully submitted that the features of claim 23 are not obvious, and the suggestion to combine the teachings of the patent application with what is seemingly the Examiner's personal knowledge comes from the patent application. For this reason alone, a prima facie obviousness rejection of claim 23 has not been presented.

Accordingly, the 35 USC §103(a) rejection of claim 23 is improper and should be withdrawn.

As an additional matter, when determining obviousness, the office is not to consider whether he or she is personally of the opinion that the claimed subject matter is obvious, but whether the claimed invention would have been obvious to one of ordinary skill at the time of the invention. (MPEP §2100 and 2142). In this case, after admitting that the subject matter of claim 23 was not taught by Williams, and without pointing to an additional reference, the Action seemingly relies to personal knowledge to modify Williams to supply the missing features.

"When a rejection in an application is based on facts within the personal knowledge of an employee of the office, the data shall be as specific as possible, and the reference must be supported, when called for by the applicant, by the affidavit of such employee, and such affidavit shall be subject to contradiction or

explanation by the affidavits of the applicant and other persons." 37 CFR §1.104(d)(2). If this rejection is maintained on a similar basis in a subsequent action, the applicant respectfully requests the Examiner to supply such an affidavit to support this modification to Williams. Otherwise, and without additional support, it is respectfully submitted the Action's conclusion does not represent the conclusion of a person of ordinary skill at the time of invention.

Claim 13 stands rejected under 35 USC §103(a) as being unpatentable over U.S. Patent no. 6,411,982 ("Williams") in view of Applicant Admitted Prior Art (AAPA). This rejection is traversed.

Claim 13 recites "wherein the first plurality of threads is a first linked list data structure", "wherein the second plurality of threads is a second linked list data structure comprising a root node that is operatively coupled to one or more other threads in the second plurality" and "wherein the single insert operation is an operation comprising inserting the root node into a position in the first linked list data structure." For the reasons discussed above with respect to claim 8, from which claim 13 depends, Williams does not teach or suggest "in an amount of time to insert a single thread into the run queue, associating the second plurality of threads that is priority sorted with the run queue, the associating maintaining a priority based scheduling semantic of the run queue", as claim 8 recites. Additionally, nowhere does the BACKGROUND section (AAPA) of this application teach or suggest such a feature of base claim 8.

For this reason alone, this 35 USC §103(a) rejection of claim 13 is improper and should be withdrawn.

Moreover, nowhere does Williams or the BACKGROUND section of this application teach or suggest "the single insert operation is an operation comprising inserting the root node into a position in the first linked list data structure", wherein the "root node that is operatively coupled to one or more other threads in the second plurality". Instead, Williams at col. 4, lines 15-30, teaches that multiple independent sub-queues are used to represent a run queue; each sub-queue queue includes only elements of a same identical priority. An element is added to a subqueue by inserting them into the bottom of the subqueue, or at the top if the subqueue is empty. Williams, at col. 2, lines 32-35, further teaches that a pointer table 104, which is an array, is used to arrange pointers to the subqueues in order of respective subqueue priorities.

In view of the above, using an array to manage independent subqueues representing elements of different priorities, regardless of whether or not the independent subqueues are implemented as respective linked lists, and wherein an element is added to a subqueue by inserting it at the bottom of the subqueue (or at the top if the subqueue is empty) does not teach or suggest "wherein the first plurality of threads is a first linked list data structure", "wherein the second plurality of threads is a second linked list data structure comprising a root node that is operatively coupled to one or more other threads in the second plurality" and "wherein the single insert operation is an operation comprising inserting the root node into a position in the first linked list data structure", as claim 13 recites.

For these additional reasons, the features of claim 13 are patentably distinguished over Williams in view of AAPA. Accordingly, and for these additional reasons, the 35 USC §103(a) rejection of claim 13 should be withdrawn

Conclusion

Pending claims 1-6, 8-21, and 23 are in condition for allowance and action to that end is respectfully requested. Should any issue remain that prevents allowance of the application, the Office is encouraged to contact the undersigned prior or issuance of a subsequent Office action.

Respectfully Submitted,

Dated: 11/19/04

By: Brian Hart

Brian G. Hart
Reg. No. 44, 421
(509) 324-9256